Department of Energy

Idaho Operations Office
785 DOE Place
Idaho Falls, Idaho 83402

December 5, 1990

Mr. Michael Gearheard, Chief
Waste Management Branch
U. S. Environmental Protection Agency
Region 10
1200 Sixth Avenue
Seattle, WA 98101

SUBJECT: Closure Plan for CPP-39, Hydrofluoric Acid Storage Tank and Dry Well

Dear Mr. Gearheard:

This correspondence forwards the Closure Plan for CPP-39, Hydrofluoric Acid Storage Tank and Dry Well, to your office for review and approval per the schedule for submission of revised closure plans under provisions of the Consent Order and Compliance Agreement (COCA).

The enclosed plan identifies the absence of RCRA hazardous constituents and recommends that the unit be clean closed under RCRA without waste removal and that the unit be delisted from further consideration under the COCA. This unit poses no risk to human health or the environment. No further action at this site is recommended.

If you have any questions, please contact W. N. Sato at (208) 526-0193 or L. A. Green at (208) 526-0417.

Sincerely,

J. E. Solecki, Acting Assistant Manager
Environmental Restoration and
Waste Management

Enclosure

cc: C. R. Koshuta, IDHW, w/encl. (2)
L. J. Mann, USGS, w/encl.
I. Resendez, DOE-ID, w/o encl.
C. R. Enos, DOE-ID, w/encl.
O. K. Earle, WINCO, w/o encl.
D. J. Blumberg, EG&G, w/o encl.
J. Rodin, EPA, w/o encl.
ERP ARDC, w/encl.

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December 4, 1990

FINAL CLOSURE PLAN FOR LDU CPP-39
HYDROFLUORIC ACID STORAGE TANK AND DRY WELL

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CLOSURE PLAN FOR LDU CPP-39

HYDROFLUORIC ACID STORAGE TANK AND DRY WELL

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EXECUTIVE SUMMARY

This closure plan is being submitted to comply with provisions of the Idaho National Engineering Laboratory (INEL) Consent Order and Compliance Agreement (COCA), which requires the submittal of a closure plan for each Land Disposal Unit (LDU). LDU CPP-39 is located in the northwest portion of the Idaho Chemical Processing Plant (ICPP) southwest of building CPP-640. LDU CPP-39 consists of an anhydrous hydrofluoric acid (HF) tank YDB-105, a concrete containment vault (CPP-745), an acid disposal pit commonly referenced as a dry well, and a 6" diameter pipe, 125' long (HFN-701) which connects the vault to the dry well.

Chemical wastes known or suspected of having been disposed to LDU CPP-39 are hydrofluoric acid (HF) and possibly dilute concentrations of boric and nitric acid. HF can be classified as a listed waste, a discarded commercial chemical product (U134), or a characteristic corrosive waste (D002) if it was generated as a process waste with a pH <2. Boric and nitric acids, if present, could be characteristic waste due to corrosivity. All known releases to the containment vault were off-specification acids from the ICPP dissolution process. Although it was standard operating procedure to discharge off-specification HF to the containment vault (YDB-105), in all known cases, the HF was mixed with boric acid for use in the process. Since the HF had entered into the dissolution process and had been mixed with another "active ingredient" (boric acid), the HF was no longer a RCRA listed waste. Since the HF and boric acid (and potentially nitric acid) disposed to the vault were RCRA characteristic wastes (D002), it is permissible to treat a D002 waste stream using elemental neutralization (e.g., the limestone in the containment vault and dry well). It was assumed that neutralization would have been achieved (2< pH <12.5) prior to disposal to the environment. No unusual occurrence reports (UORs) have been recorded to support that any spills or leaks of listed HF occurred at the tank during filling and transferring to the makeup area. Therefore, the known releases to the containment vault are Resource Conservation and Recovery Act (RCRA) characteristic wastes.

In July 1990, after the limestone (used to neutralize the off-specification HF) was removed from the containment vault, an inspection of the concrete vault showed a crack in the southeast corner at the wall and floor interface. A 2-foot diameter hole was located in the concrete floor at the southwest corner of the vault. This was the approximate location of the drain for the transfer line (HFN-701) to the dry well. The concrete in this area was visibly stained, and a cavity to the underlying soils was present to a depth of approximately 4 feet. No other cracks were observed in the vault floor (Golder 1990d).

LDU CPP-39 was characterized in accordance with the COCA. The objectives of this characterization were to determine the presence, nature, and extent of any hazardous constituents/wastes in the containment vault, dry well and subsurface soils and to determine the potential risk to human health and safety or the environment. Five boreholes were drilled to depths of up to 4 feet in the containment vault, and one borehole was drilled to the top of the basalt (52.2 feet) in the dry well at LDU CPP-39. Four inorganic hazardous constituents (silver, arsenic, lead, and fluoride) were detected above background; silver in two samples, arsenic in one sample, and lead in one sample. Fluoride was also detected in the containment vault and the dry well. Organic analysis identified Bis (2-ethylhexyl)phthalate (BEHP) and eleven polycyclic aromatic hydrocarbons (PAHs) at a depth of 15 feet in the soil at the dry well.

All constituents were subjected to a Health and Environmental Assessment, as recommended under RCRA Facility Investigation Guidance. This assessment indicated that only the PAHs detected were above the 1E-06 level. A conservative estimate indicates that the highest potential risk is 2E-05. Since there is insufficient data for individual PAHs, this estimate assumes a slope for all detected PAHs equal to a previously published value for benzo(a)pyrene, a known carcinogen. Furthermore Benzo(a)pyrene has been withdrawn by EPA for re-evaluation.

In conclusion, no RCRA hazardous wastes were detected and all RCRA hazardous constituents detected were present at levels below those that would pose an unacceptable risk to human health and safety or the environment. For these reasons, there does not appear to be any basis for remediation. It is therefore being recommended that LDU CPP-39 be closed without removal actions. If any future activity is deemed necessary, this closure plan will be amended at that time under the upcoming INEL Interagency Agreement.

FINAL CLOSURE PLAN FOR LDU CPP-39

HYDROFLUORIC ACID STORAGE TANK AND DRY WELL

EPA Facility ID No.: ID 4890008952

Owner/Operator: Dept. of Energy, Idaho Operations Office
785 DOE Place
Idaho Falls, Idaho 83402
(208) 526-1505

Facility Address: Idaho Chemical Processing Plant
Scoville, Idaho

1.0 FACILITY CONDITIONS

1.1 General Description

Land Disposal Unit (LDU) CPP-39 is located in the northwest portion of the Idaho Chemical Processing Plant (ICPP) inside the security fence and southwest of building CPP-640 (Figures 1 and 2).

LDU CPP-39 consists of an anhydrous hydrofluoric acid (HF) tank YDB-105, a concrete containment vault (CPP-745), an acid disposal pit commonly referenced as a dry well, and four pipes (one of which is 6 inches in diameter and 125 feet long (HFN-701)) that connects the containment vault to the dry well).

YDB-105 was a 6,200 gallon, carbon steel tank that served as a central supply of 44 Molar (M) HF acid for the dissolution of uranium enriched zirconium alloys in building CPP-601 between 1967 and 1985 (Figure 3). The tank and all piping from CPP-604 to the tank was removed and disposed of at the Central Facility Area (CFA) landfill in August 1990. Prior to removal, the tank was drained of remaining acid, flushed four times with water, and flushed once with water and sodium carbonate to neutralize. The piping associated with the tank was also drained and flushed prior to disposal.

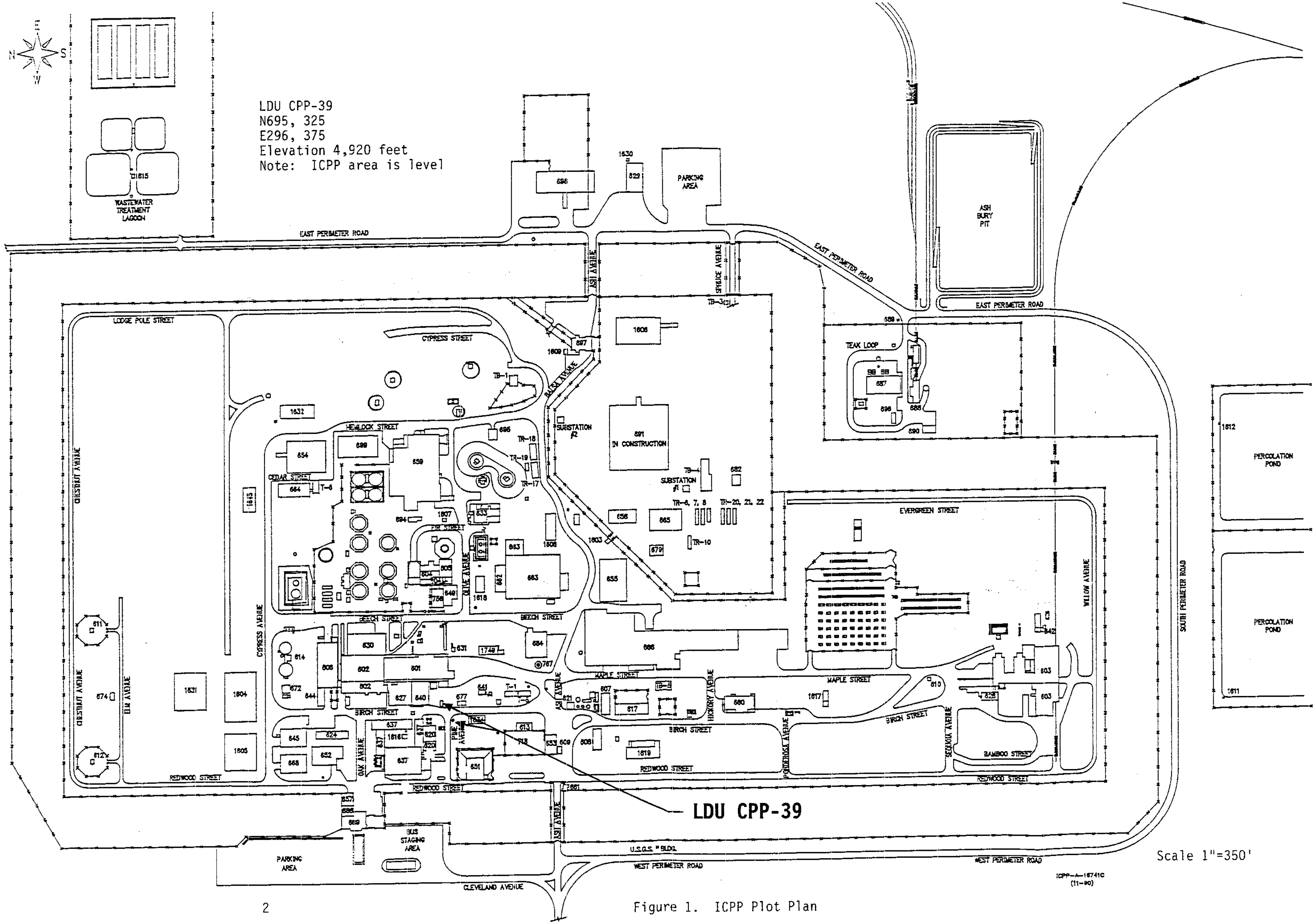

Figure 1. ICPP Plot Plan

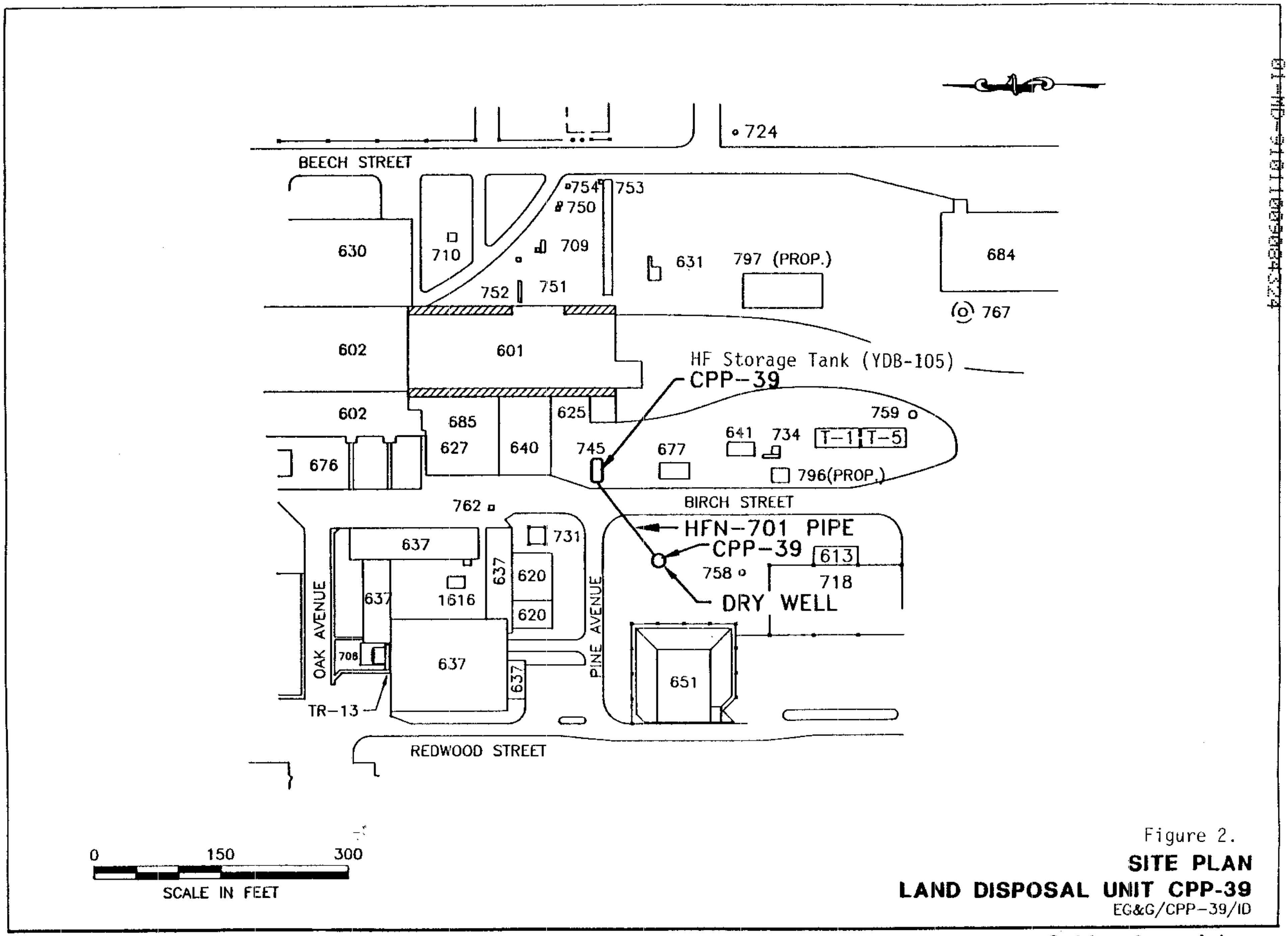

Figure 2.

SITE PLAN

LAND DISPOSAL UNIT CPP-39

EG&G/CPP-39/ID

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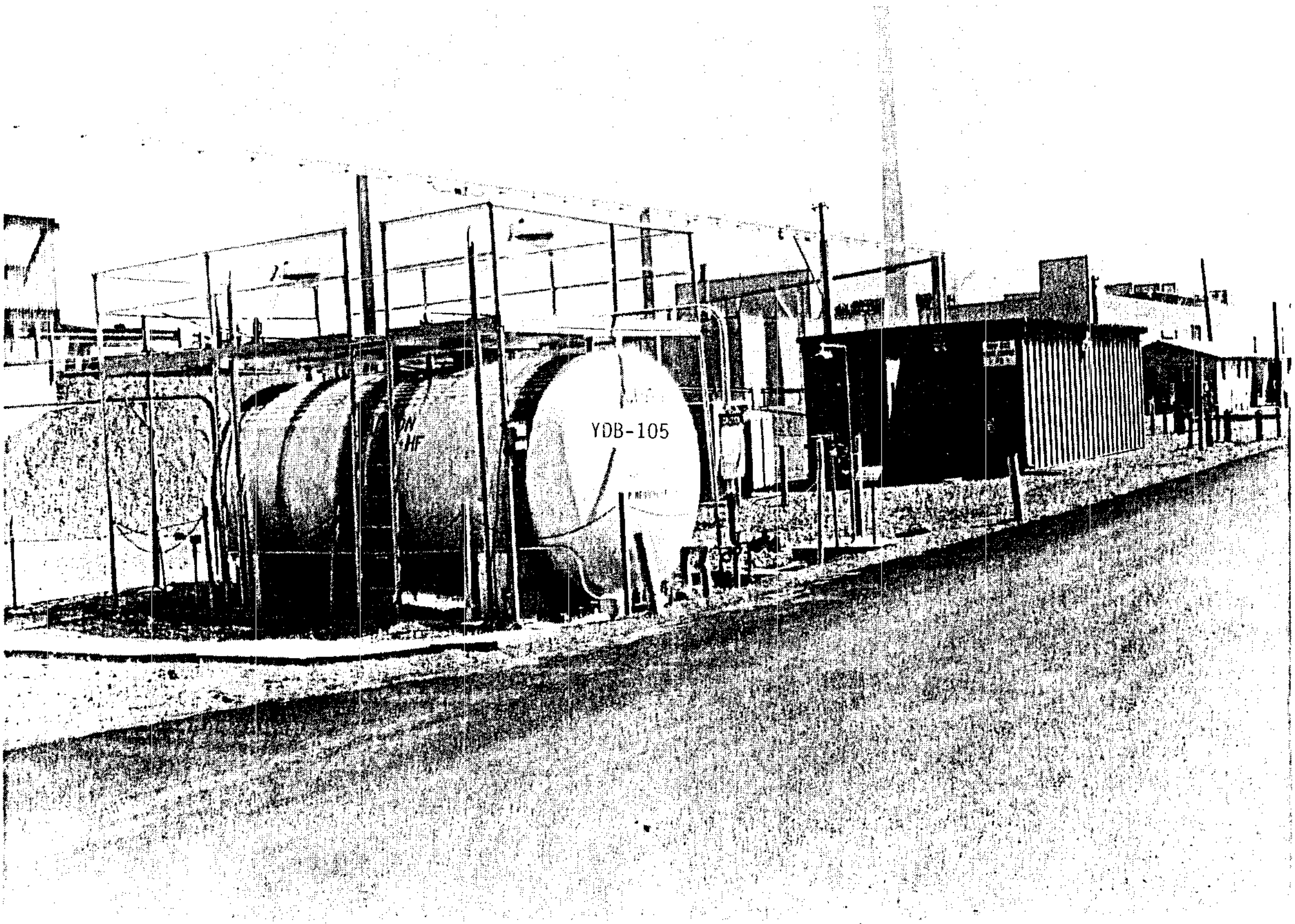


Figure 3. **HF Storage Tank (YDB-105)**

The rectangular concrete containment vault is 11' x 24' x 5.5'. It is positioned under YDB-105 to contain any excess acids which may have escaped as a result of refilling and to trap overflow. The vault was filled with limestone rock for neutralizing any acids which enter the vault. The limestone in the containment vault was removed in October 1990. After the limestone was removed, an inspection of the concrete vault found a crack in the southeast corner at the wall/floor interface. In addition, a two foot diameter hole was located in the concrete floor at the southwest corner of the vault. This was the approximate location of the drain for the transfer line (HFN-701) to the dry well. The concrete in the area of the drain (hole) was visibly stained, and a cavity to the underlying soils was present to a depth of approximately four feet. No other cracks were observed in the vault floor.

The pipe (HFN-701) connecting the containment vault and dry well is constructed of vitrified clay and is 125 feet long. The pipe has been grouted and abandoned in place. The entire pipe is currently beneath the asphalt paved road and parking area.

The dry well (Figure 4) is located to the east of building CPP-651. The dry well is situated to the southwest of YDB-105 near the intersection of Birch and Pine Streets. The waste disposal pit which contained limestone rock is a cemented circular structure 22.5 feet in circumference with a depth of 15 feet. The purpose of the dry well was to receive the discharges of off-specification HF from CPP-601 to the containment vault. Records indicate that the well received approximately 1,400 gallons of HF per year for a total of approximately 23,800 gallons. Additionally, dilute concentrations of boric and nitric acid may have also been discharged to the neutralization pit. The limestone in the dry well was removed in October 1990.

CPP-39 was initially declared an LDU. This was based on the routine and systematic disposal of process generated off-specification HF (characteristic waste - pH <2) to the containment vault. This acid was assumed to be neutralized by the limestone in the vault and dry well. However, because of the uncertainty for complete neutralization of the acid, a potential pathway

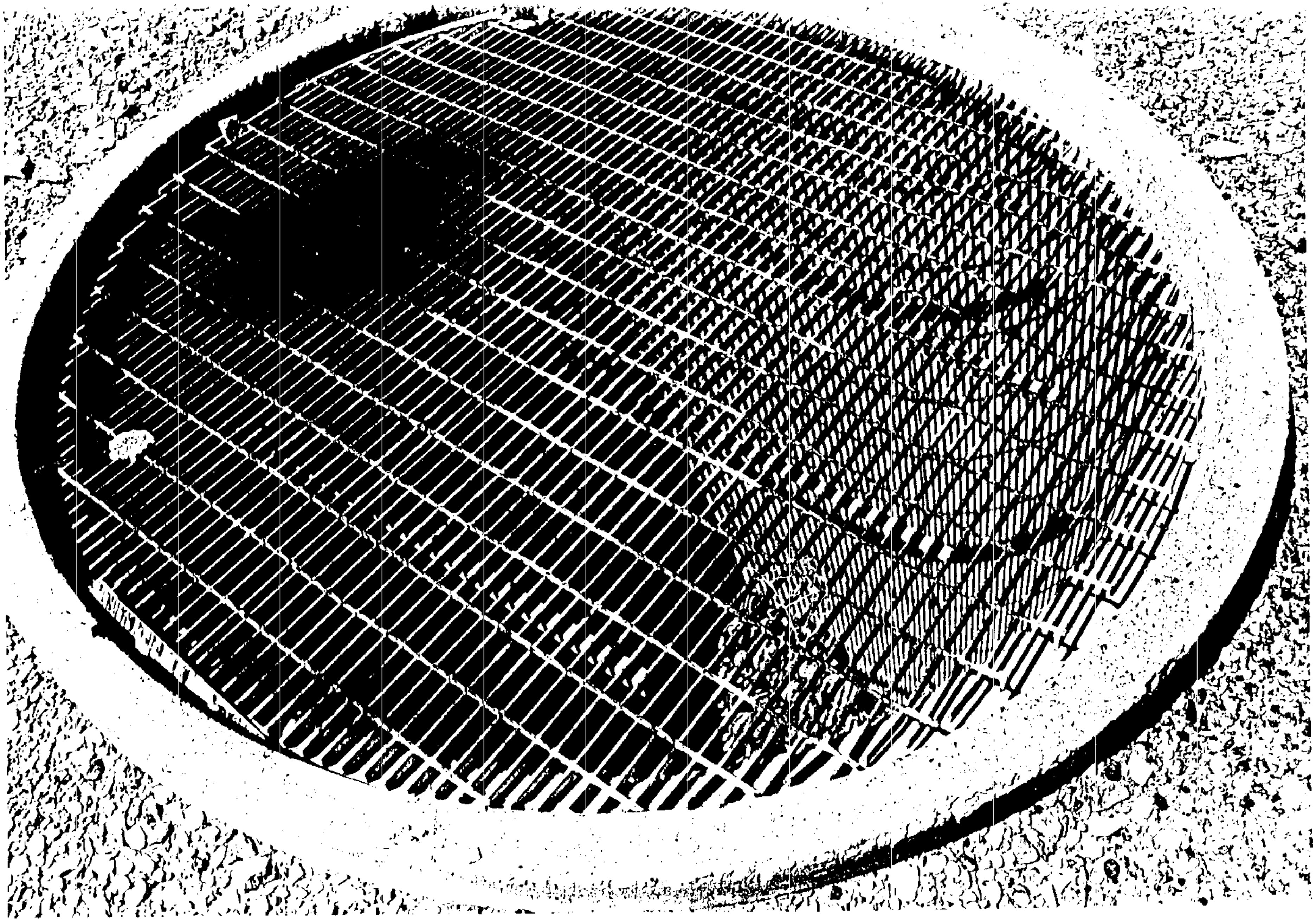


Figure 4. LDU CPP-39 Dry Well

to the soil could exist. Therefore, characterization at this site was conducted.

1.2 Unit Characterization Objectives

LDU-39 was characterized in accordance with the Idaho National Engineering Laboratory (INEL) Consent Order and Compliance Agreement (COCA). The objectives of this characterization were to determine the presence, nature, and extent of any hazardous wastes/constituents in the containment vault, dry well, and subsurface soils and to determine the potential risk to human health and safety or the environment.

1.3 Closure Goals

The goal of this closure plan is to:

- Eliminate this unit from further consideration under the COCA, based on technical data indicating that the HF releases do not pose an unacceptable risk to human health and safety or the environment.

- Meet the requirements of the COCA to submit a closure plan for LDU CPP-39, as committed per letter to EPA Region X (January 1990).

2.0 GEOLOGY

The ICPP is located along the northern edge of the Eastern Snake River Plain (ESRP) (Figure 5). This portion of the plain is a structural and topographic basin 50 to 70 miles wide and some 200 miles long, extending from the Snake River in the Twin Falls-Hagerman area north to Island Park. The present topography of the ESRP is dominated by basalt cinder cones and rhyolite buttes. Surficial sediments at the ICPP consists of alluvial materials deposited by the Big Lost River. These sediments consist of well graded gravels, sands, intermittent silt, and sandy clay lenses. Surface alluvium extends to the top of the basalt, generally around 35 to 50 feet. In many

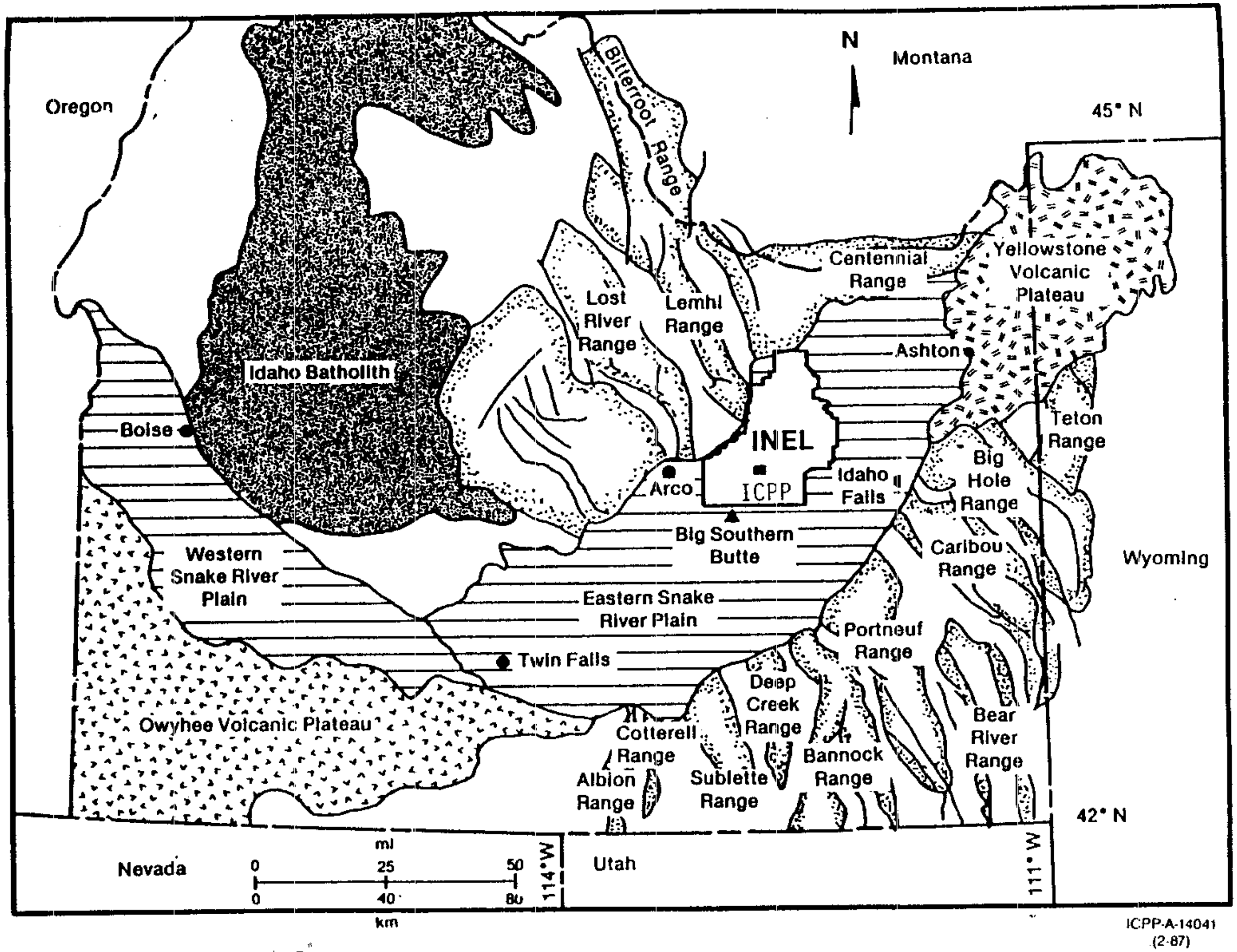


Figure 5. Generalized map of southern Idaho showing geographic and geologic features.

areas around the ICPP there is a layer of fine grained sandy clay and clayey or silty sand at the basalt/surface sediment interface. This layer is anywhere from 0 to 10 feet thick. Hydraulic conductivity of this fine grained material ranges from 1 x 10^{-6} to 3 x 10^{-2} cm/sec. Hydraulic conductivity of the coarser surface material ranges from 3 x 10^{-3} to 2 x 10^{-1} cm/sec.

The stratigraphy of the ESRP consist of thin (averaging <25 feet) basaltic lava flows with numerous interbedded sediments and cinder zones. The sediments are of lacustrine, eolian, and fluvial origins with source areas in the neighboring mountain ranges. These sediments also occur as fracture fillings in the basalt flows. The flows are mainly composed of a very dark gray to black, variably vesicular, olivine basalt. The physical and chemical composition of the interbed material is yet to be determined. This sequence of flows and interbeds extends for a depth of 2,000 to 3,000 feet (Doherty 1979).

Underlying these basalt flows is a thick (5,000 feet) sequence of welded rhyolite tuff. Interbedded within these welded tuffs are layers of tuffaceous sands, air-fall ash, and ash flow tuffs (Doherty 1979).

The deepest rocks encountered at the INEL are a dense, hydrothermally altered, recrystallized, aphanitic rhyodacite porphyry. This unit extends from approximately 8,100 feet to below 10,300 feet (Doherty 1979).

2.1 LDU CPP-39 Site Geology

LDU-39 is located on granular fill that overlies alluvium deposited by the Big Lost River. The geology encountered beneath both the containment vault and dry well consists of unstratified sand and gravel with a trace (<5%) of silt and clay. The soils in the dry well graded from loose to very dense at a depth of 19.6 feet below ground surface, which may indicate a contact with native alluvium beneath the disturbed or fill material. Fine sands, silts, and clays were present beneath the coarse-grained soils at a depth of 47.5 feet and extended to the basalt at 52 feet.

3.0 HYDROGEOLOGICAL CHARACTERIZATION

3.1 Surface Water

The only surface water feature in the area of the ICPP is the dry channel of the Big Lost River. This channel is located approximately 20 feet from the northwest corner of the ICPP (Figure 6). Water flow in the river is intermittent and flows on to the ICPP only during years with high spring snow melt run-off from the mountains. Even during these wet years, the river will normally only flow in the late winter and spring months. The last time there was recorded flow in the Big Lost River in the area of the ICPP was 1987. The general slope of the terrain for the ICPP is towards the river channel at about 0.07%.

3.2 Groundwater

All subsurface water at the ICPP, including the Snake River Plain Aquifer (SRPA), is under water table conditions. There is evidence, however, that artesian conditions exist at various depths within the SRPA. This is believed to be attributable to variations in the hydraulic conductivity of the basalt (Mann 1989).

Due to the low permeability of the sedimentary interbeds, various perched zones are formed as surface infiltration percolates down through the basalt. There are four known perched zones which occur at:

- the sediment/basalt interface (approximately 40 to 50 feet below ground surface)
- the 110-foot interbed (a zone of thin basalt flows and sediment interbeds averaging approximately 50 to 60 feet thick)
- the 265-foot interbed (a low permeability cinder zone of approximately 30 feet thickness)
- the 365-foot interbed (low permeability clay interbed of approximately 20 feet thickness)

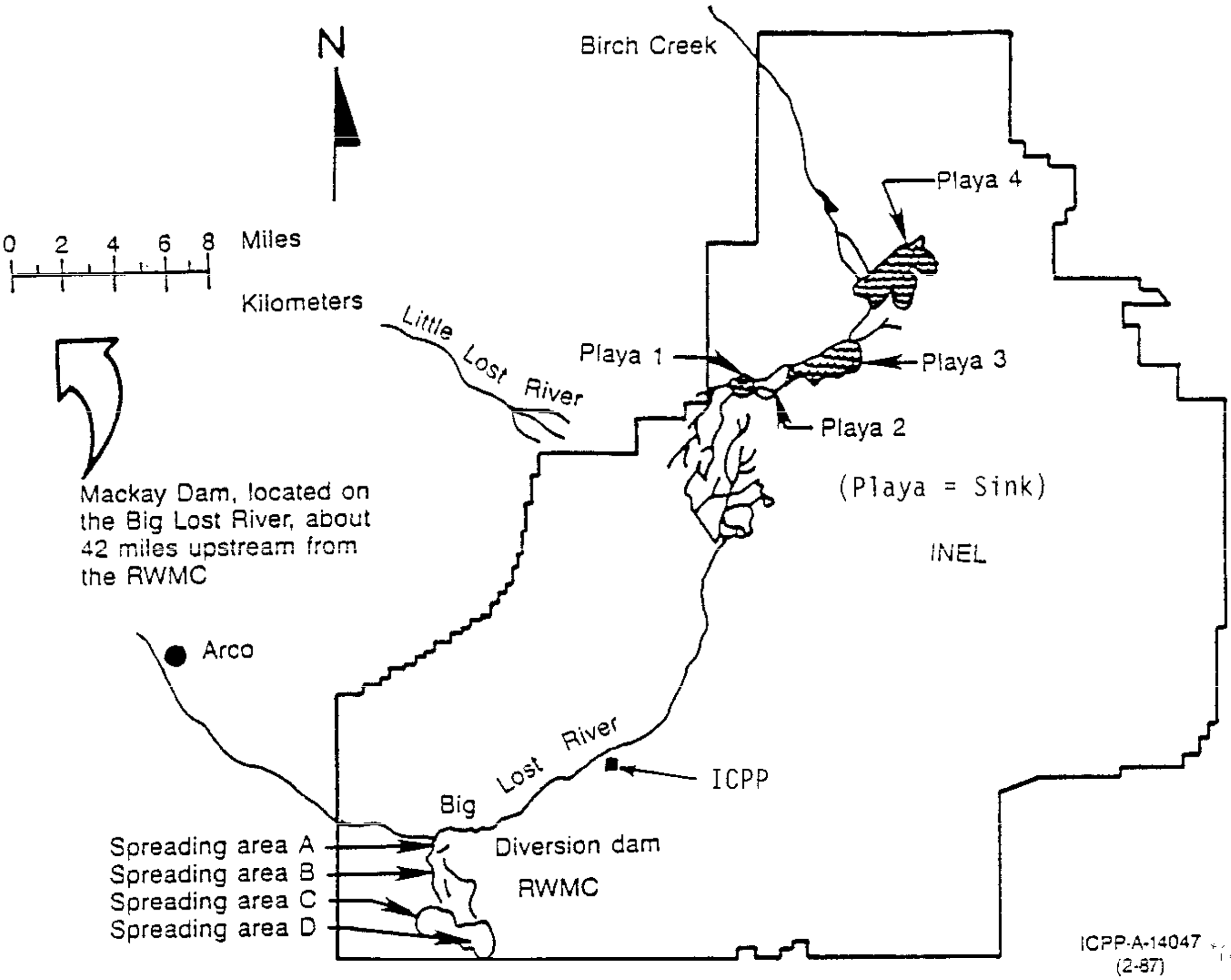


Figure 6. Surface water features at or near the INEL (Robertson, et al., 1974)

The actual areal extent of these perched water zones is under investigation. According to Cooper (1988), there does not appear to be a hydraulic connection between the regional SRPA system and the perched zones in that pumping one zone has no apparent effect on the water level in the other.

The SRPA is the primary source of drinking water for most of eastern Idaho. Estimates show nearly 2 x 10^9 acre-feet of water exist in the aquifer with the INEL using approximately 5.6 x 10^3 acre-feet per year. Regional flow in the aquifer is northeast to southwest (Figure 7), however, local flow in the area of the ICPP is more north to south. Tracer studies show flow rates within the aquifer to be variable from 5 feet to 20 feet per day, with an average near 10 feet per day. Depth to this aquifer in the vicinity of the ICPP is approximately 450 feet. The results of pump tests at various depths indicate that the upper 200 to 300 feet of the SRPA are the most porous and account for most of the flow. Based on these results and variations in hydraulic conductivities of the basalts the effective base of the SRPA is estimated to be 750 to 800 feet.

4.0 METEOROLOGY

Meteorological information has been compiled for the INEL as a whole. However, since the ICPP is located between two of the weather stations, this data can be considered valid for the ICPP. The following information is condensed from the Climatography of the Idaho National Engineering Laboratory, 2nd Edition (1989).

The following information is being provided to allow for an evaluation for factors which may act to inhibit or promote migration of hazardous wastes/constituents from the site.

4.1 Data Source

The National Oceanic and Atmospheric Administration (NOAA) and its predecessor, the U.S. Weather Bureau, have operated a meteorological

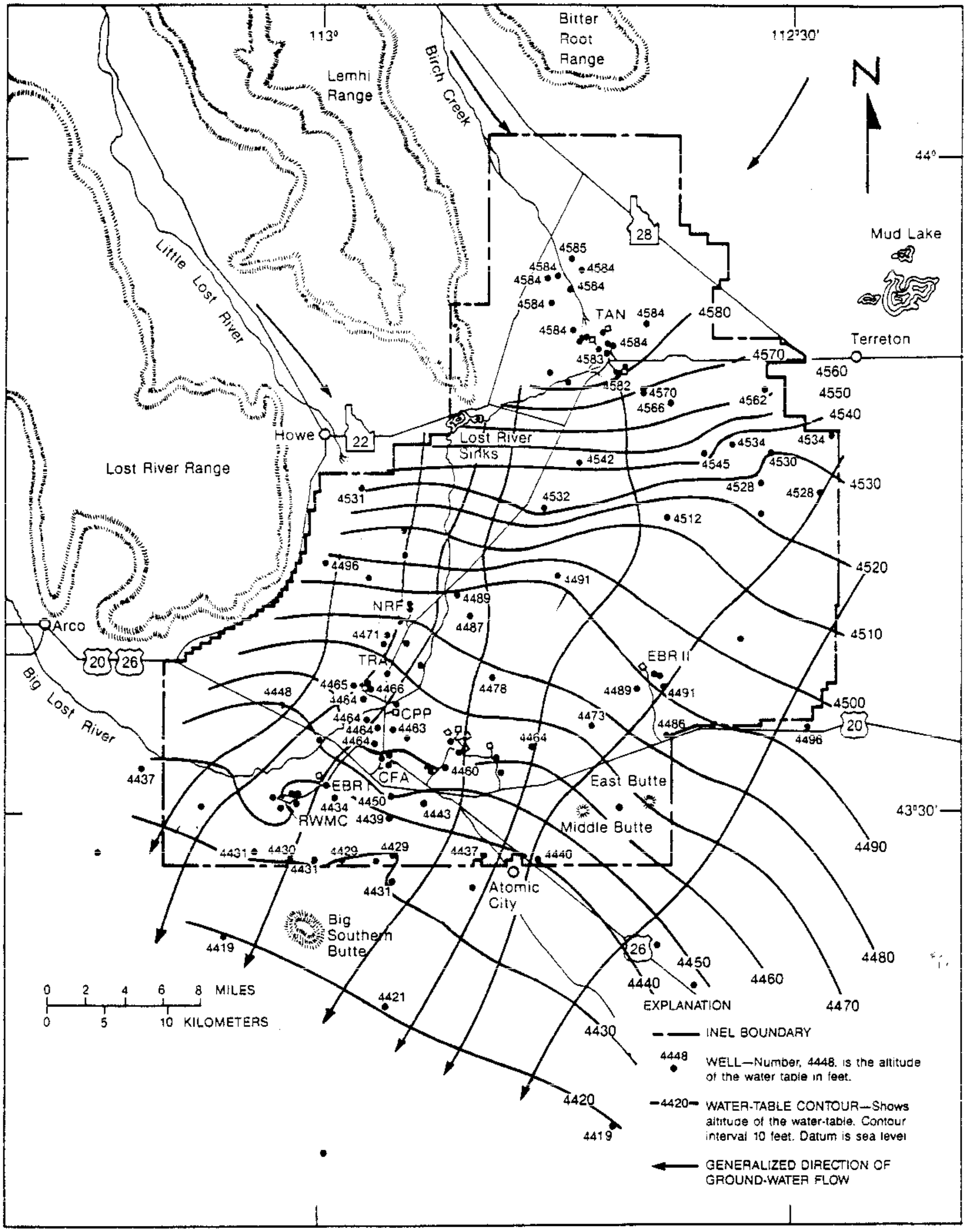


Figure 7.--Altitude of the water table for the Snake River Plain aquifer and general direction of ground-water movement, July 1985.

observation program at the INEL since 1949. There are two, 250 foot weather towers located within 3 miles of the ICPP. The station located at the Central Facilities Area (CFA), south of the ICPP, was the first on-site station and appears on National Climatic Center records as "Idaho Falls 46 W".

4.2 Precipitation

The average annual precipitation for the area around CFA is 9.07 inches. The yearly totals range from 4.50 to 14.40 inches. Individual months have had as little as no precipitation to as much as 4.42 inches. Maximum observed 24 hour precipitation amounts are just above 1.75 inches and maximum 1 hour amounts are just over 1.0 inch.

About 26.0 inches of snow fall each year at the INEL. The maximum yearly total was 40.9 inches, and the smallest total was 11.3 inches. The greatest 24 hour total snowfall was 8.6 inches. The greatest snow depth observed on the ground was 27 inches.

4.3 Evaporation

While extensive evaporation data has not been collected on the INEL, evaporation information is available from Aberdeen and Kimberly in southeastern Idaho. This data, which should be representative of the INEL region, indicates that the average annual evaporation rate is about 36 inches. About 80% of this, 29 inches per year, occurs from May through October.

4.4 Wind and Temperature

Wind patterns at the INEL can, at times, be very complex. The orientation of the bordering mountain ranges to the northwest plays an important role in determining the wind regime. In general, the INEL lies in a belt of prevailing westerly winds. However, due to the channeling effect of the bordering mountain ranges, the prevailing winds are west-southwest or southwest. Local mountain and valley features also strongly influence wind flow at the site. Drainage winds contribute to the overall wind flow at the

ICPP. During the night hours rapid surface cooling creates masses of cold dense air that moves down slope primarily as a wind out of the north-northeast. A reverse flow occurs, in the opposite direction, during the day as the air up-slope heats faster and rises relative to that down-slope. This contributes to the overall winds from the southeast.

Average monthly maximum temperatures range from 92.9°F in July to 19.5°F in January. Average monthly minimum temperatures range from 53.6°F in July to -8.8°F in January. Since 1951, soil temperatures around the INEL have been studied. Data shows that soil surface temperatures can range from highs of 138°F to lows of -20°F for a copper probe.

5.0 KNOWN OR SUSPECTED CHEMICAL WASTE TYPES

Chemical wastes known or suspected to have been disposed to LDU CPP-39 are hydrofluoric acid (HF) and possibly dilute concentrations of boric and nitric acid. The HF disposed of at LDU CPP-39 is classified as a characteristic waste (D002), because it was generated as a process waste with a pH <2. Boric and nitric acids, if present, could be characteristic wastes (D002) due to corrosivity. Based on process knowledge, product HF (listed waste U134) was transferred from tank YDB-105 to the CPP-601 makeup areas. HF is mixed with borated water in this makeup area. If the solution is within specification it is introduced into the dissolution process. If the solutions were off-specification they were returned to the containment vault for neutralization. No unusual occurrence reports (UORs) have been recorded to support that any spills or leaks of listed HF occurred at the tank during filling and transferring to the makeup area. The waste types known or suspected to have been disposed to LDU CPP-39 were off-specification acids from the ICPP dissolution process.

6.0 PRE-CLOSURE SAMPLING AND ANALYTICAL PLAN

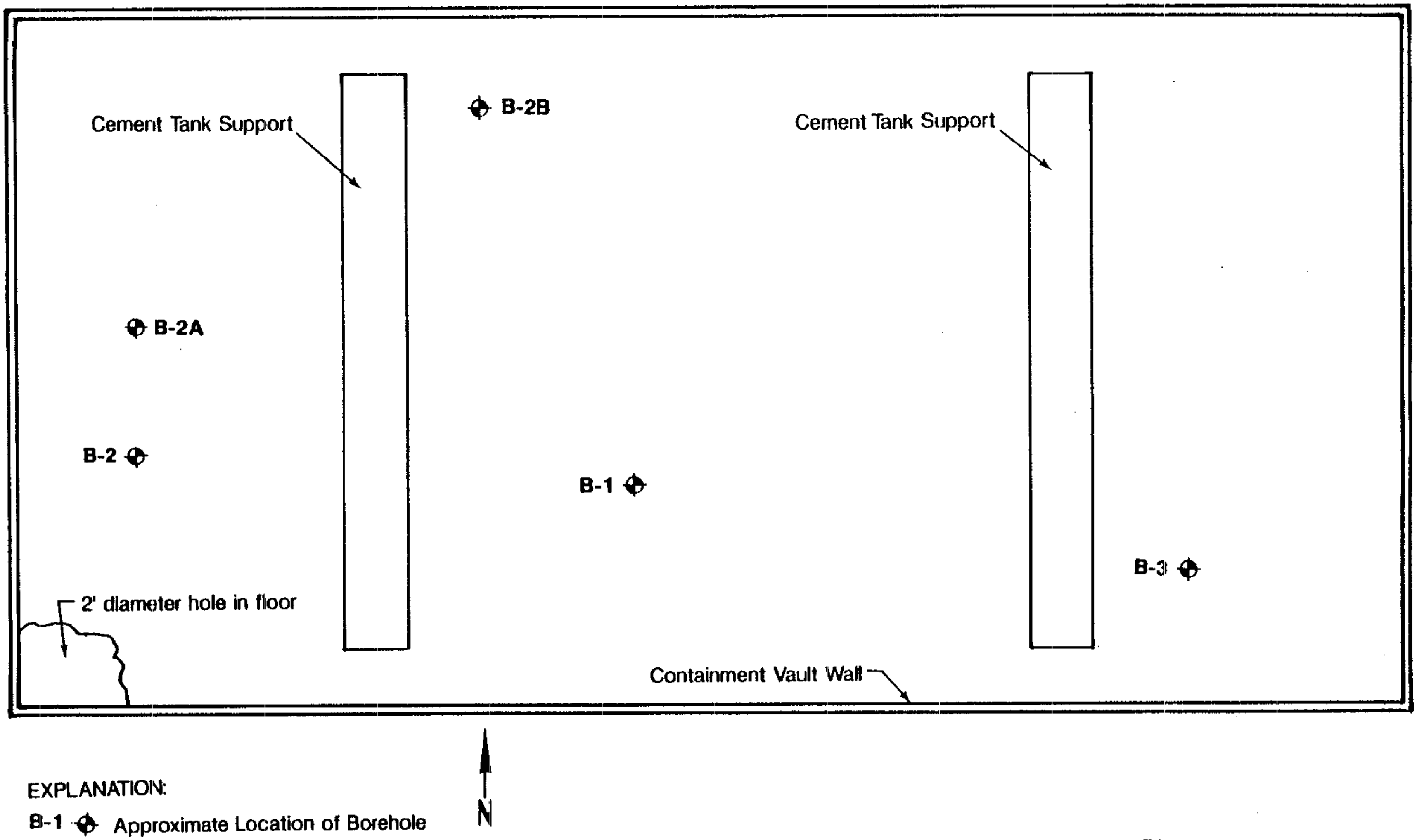
6.1 Unit Sampling

It is known that large quantities of HF were used at CPP-601 between 1967 and 1985 and that discharges of off-specification acids occurred which drained from the containment vault to the dry well. Thus sampling has been conducted to determine if RCRA hazardous waste/constituents were present and to what extent.

6.1.1 Sampling and Drilling

Hawley Brothers Drilling of Blackfoot, Idaho, was contracted to conduct the drilling at LDU CPP-39, while Golder Associates Inc., was in charge of sampling operations. Drilling and sampling operations were conducted from July 5 to July 25, 1990. The drill rig was decontaminated by high pressure steam cleaning prior to entering and after leaving the ICPP. Golder Associates personnel visually inspected the drill rig and downhole tools for grease, hydraulic fluid, and other visible materials that could potentially contaminate the borehole.

Sampling was accomplished by drilling in five locations in the containment vault to a maximum depth of 4 feet, and by drilling one borehole in the dry well to the depth of the underlying basalt (52 feet). These sample locations were selected after the limestone was removed from the containment vault. Specific locations for drilling and sampling were made based on visual observations of the concrete (stains). The visual inspection revealed a crack in the southeast corner at the wall and floor interface, and a hole (approximately 2 feet in diameter and 4 feet deep) in the southwest corner of the containment vault. There was no evidence of the pipeline leading from the vault to the dry well. Sample locations are shown in Figure 8.



EXPLANATION:

B-1 ⊕ Approximate Location of Borehole

NOT TO SCALE

Figure 8.

BOREHOLE LOCATIONS IN THE CONTAINMENT VAULT CPP-39

EG&G/CPP-39/ID

PROJECT NO 893-1195-310 DWG NO 23539 DATE 10/12/90 DRAWN HP APPROVED

Golder Associates

In the containment vault, an air-operated jack hammer was used to excavate holes in the concrete and provide access for soil sampling. Soil samples were collected below the concrete with hand augers. Soil samples were collected at 1, 2, and 4 feet below the concrete. None of the boreholes reached the target depth of 6 feet due to refusal. The refusal may have been associated with large cobbles in the alluvium.

At the dry well, drilling was conducted with a 6-inch outside diameter (OD) hollow stem auger. Samples were obtained by driving a 24- by 4-inch OD California split spoon sampler containing a 24-inch clear lexan inner barrel with a rig mounted, cathead-operated 140 pound safety hammer. When refusal was encountered, the driller would auger until sampling could continue. The Drilling Project Engineer (DPE) recorded the number of blows required to advance the sampler in 6-inch increments. Samples were collected at 5-foot intervals, beginning at the base of the dry well's soils at 14.5 feet and terminating at a depth of 50 feet. The top of the basalt was encountered at 52 feet. The borehole was then backfilled with volclay pellets at the bottom and grouted to 15 feet below the land surface, which is the approximate depth of the bottom of the dry well.

6.2 Background Sampling

Data from background samples collected in 1986 and 1987 by the University of Utah Research Institute (UURI), Salt Lake City, Utah, was used. Ten background samples were collected to support preliminary sampling activities at LDU CPP-48 and SWMUs CPP-45 and CPP-46 (UURI 1986, UURI 1987). The background samples (Figure 9) were collected at surface and at 6, 18, and 24 inches from seven sample locations outside of the ICPP security fence. The sampling locations were selected based on knowledge of past plant activities that could have disturbed or contaminated the soils. The locations were chosen to exclude areas where prior construction/excavation activities or

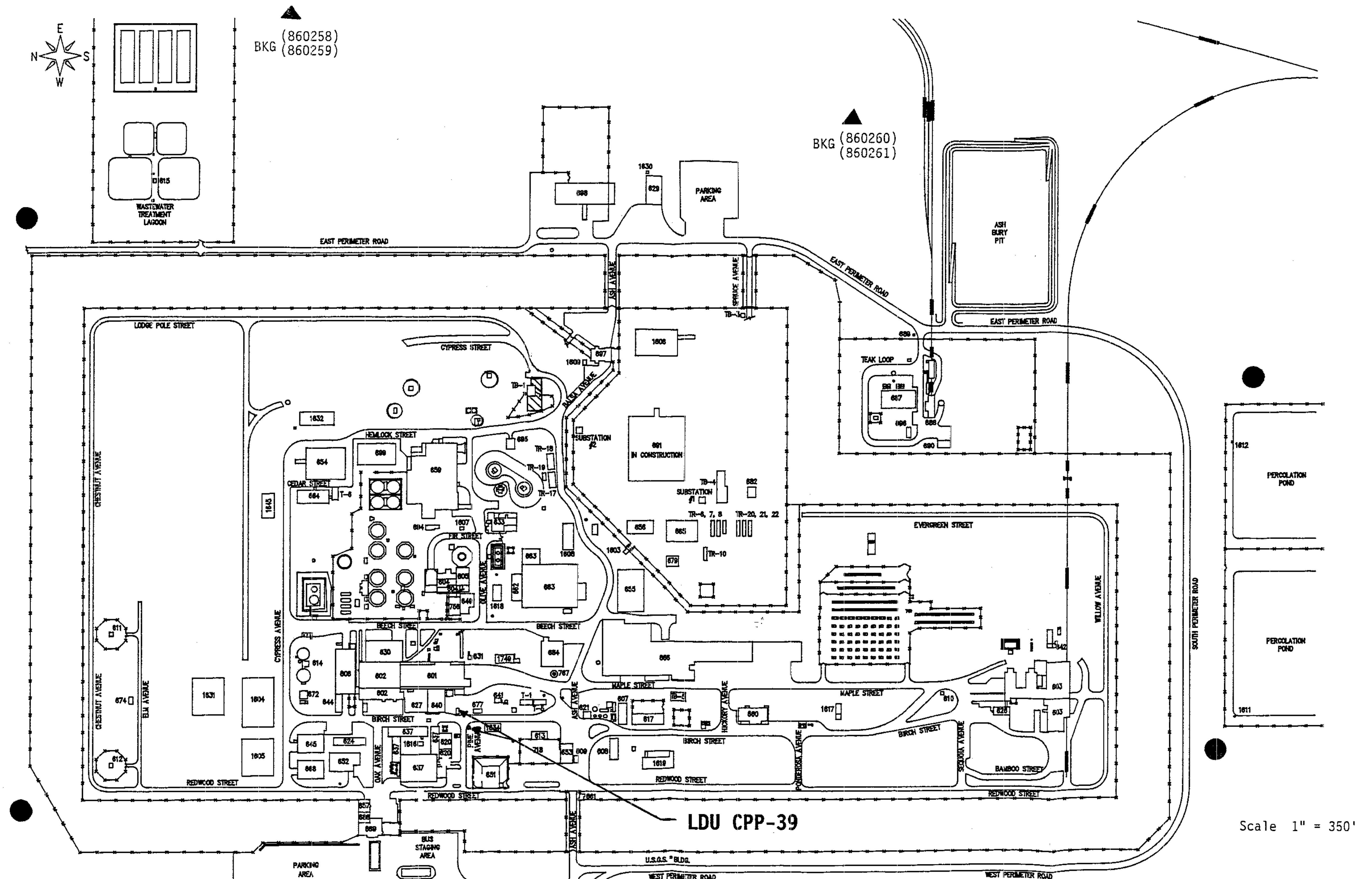


Figure 9. Background sampling locations

LEGEND

Approximate location for FPR Warehouse ● and Zirconium Feed Tank Storage Areas ▲

releases of hazardous wastes/radiological contamination were known to have occurred.

The background samples (Bkg 1-4) collected by UURI for the Fuel Processing Restoration (FPR) warehouse site (associated with LDU CPP-48) were analyzed for heavy metals. Background samples (258-265) collected for the chemical storage (associated with SWMU CPP-45) and zirconium feed tank storage (associated with SWMU CPP-46) areas were analyzed for pH, nitrates, aluminum, zirconium and heavy metals. The background samples were analyzed for hazardous constituents suspected to be present in the three units. The results of the background sample analyses are shown in Table 1. All background samples were collected and analyzed using EPA methods (see footnote 1 on Table 1). The UURI report stated that the soils taken from the background locations were geologically identical to the soils in the sampling areas on the ICPP. Since all background samples were collected adjacent to the ICPP and all sampling and analyses were conducted using EPA methods, the results were used for comparison with shallow alluvial soils at the ICPP.

6.3 Sample Handling and Analysis

Samples were collected at the soil surface base of the dry well (14.5 to 18.5 feet) and from the fine grained sediments above the basalt (49 to 51 feet) and were analyzed for 40 CFR Part 261 Appendix VIII constituents.

Samples collected from the other intervals of the dry well were analyzed for metals, pH, and fluoride. The 2 inches of material from top and bottom of the lexan tube were discarded. The remainder of the sample from the lexan tube was transferred into a clean stainless steel bowl and was mixed thoroughly with clean stainless steel utensils. The remaining material was transferred into two, plastic, 8 ounce containers with teflon lids. Additional material was archived.

Samples of the concrete were also collected prior to drilling each borehole at the containment vault. These samples were obtained by using an air operated jack hammer. A hand auger was then used to collect soil samples below the

Table 1.

Background Concentrations of Metals in Soils Sampled from Outside the ICPP Facility and One-Sided Normal Tolerance Intervals[1]								
BACKGROUND SAMPLE	RESULTS IN PPM							
	Arsenic	Barium	Cadmium	Chromium	Lead[2]	Mercury	Selenium	Silver
Bkg 1	5.6	200	<5	25	12	0.043	0.484	<2
Bkg 2	5.1	270	<5	32	16	0.019	0.405	<2
Bkg 3	6.5	270	<5	33	17	0.027	0.467	<2
Bkg 4	7	250	<5	34	12	0.028	0.341	<2
258	5.6	280	<5	28	<10	0.025	0.113	<2
259	7.6	380	<5	26	<10	0.057	0.252	<2
260	6.4	240	<5	28	<10	0.023	0.695	<2
261	6.2	220	<5	18	<10	0.03	0.236	<2
264	6	230	<5	28	<10	0.021	0.102	<2
265	7.6	210	<5	20	<10	0.046	0.227	<2
Maximium	7.6	380	<5	34	17	0.057	0.695	<2
Minimium	5.1	200	<5	18	<10	0.019	0.102	<2
Average	6.4	255	<5	27	9	0.032	0.332	<2
Std. Dev. (SD)	0.8	51	--	5	5	0.013	0.184	--
Background UTI[3]	8.7	403	--	42	24	0.070	0.868	--

1. All analyses are total constituent analyses, using EPA approved methods (SW846), and are reported on a weight per dry basis. Samples Bkg 1 - 4 were from the FPR Warehouse site (SWMU CPP-46); samples 258 - 265 were from the Zirconium Feed Storage Tank site (SWMU CPP-53).

2. Where lead values are listed below detection limit, a value of one-half the detection limit was used in the calculation of the average standard deviation and tolerance limit values.

3. The background one-sided upper tolerance interval (UTI) is x + K*SD, where the K value (tolerance factor) for sample size n = 10 is equal to 2.911 with a probability level y = 0.95 and coverage P = 0.95.

concrete. The upper and lower 2 inches of sample were discarded, and the remaining material was prepared as described above. All samples were analyzed for metals, pH, and fluoride.

Samples were labeled and placed in an appropriate shipping container with the necessary amount of coolant for maintaining the samples at 4°C. Samples were then transferred by overnight carrier under chain-of-custody procedures to the analytical laboratory. Gulf South Environmental Laboratory Inc., (GSELI) of New Orleans, Louisiana performed all analysis for Appendix VIII constituents (CFR 40 Part 261, Appendix VIII) except for dioxins and furans which were analyzed by Southwest Laboratory of Oklahoma Inc., of Tulsa, Oklahoma. The remaining samples for metal, pH, and fluoride were analyzed at Pacific Northwest Environmental Laboratory Inc., (PNELI) of Redmond, Washington. The results of detected analytes are shown in Table 2. Applicable EPA methods were used by all subcontracted laboratories.

6.4 Quality Assurance/Quality Control

Quality assurance/quality control procedures (Golder 1990c), were implemented during the sampling and analysis program for CPP-59. The Golder Quality Assurance (QA) Program Plan was developed in compliance with the requirements of ANSI/ASME NQA-1, Quality Assurance Requirements for Nuclear Facilities (ASME 1986), which is defined as the preferred standard for all projects conducted at nuclear facilities by U.S. Department of Energy (DOE) Order 5700.6B, Quality Assurance (DOE 1986). In addition, the QA Project Plan was written in compliance with the guidelines provided by Interim Guidelines for Preparation of Quality Assurance Project Plans (QAMS/005). Interpretations of QAMS/005 and expanded guidance provided by other applicable EPA guidance documents were considered during the preparation of the QA Project Plan.

6.4.1 Blanks

Trip blanks were submitted for volatile organics analysis in all sample shuttles. Acetone (6 to 10 μg/L) and methylene chloride (27 to 29 μg/L)

Table 2.

SUMMARY OF
DETECTED ANALYTES/COMPOUNDS
LAND DISPOSAL/UNIT CPP-39
(Results in mg/kg, except where noted)

Analyte/Compound	Range of Detected Values
Aluminum	12,500 - 13,400
Antimony	7.0 - 15.3
Arsenic	2.5 - 12.4
Barium	64.7 - 229
Calcium	2,320 - 103,000
Chromium	9.9 - 32.3
Cobalt	7.9 - 10.1
Copper	29.6 - 53.9
Iron	6,180 - 19,700
Lead	2.9 - 31.1
Magnesium	6,420 - 75,600
Manganese	405 - 428
Nickel	4.1 - 32.0
Potassium	1,810 - 5,750
Selenium	<0.21 - 0.33
Silver	0.75 - 18.7
Sodium	862 - 13,600
Thallium	0.30 - 0.40
Vanadium	22.7 - 34.3
Zinc	94.9 - 115
Cyanide	1.3
Sulfide	1.75 - 4.11
Tin	7.8 - 11.4
pH	5.97 - 12.6
Fluoride	0.125 - 414
Methylene Chloride (μg/kg)	44 - 120

were detected in the trip blanks submitted. These compounds were also detected in the laboratory method blanks from 8 to 12 μg/L.

Two equipment blank samples were also submitted for metals analysis and one sample for pH and fluoride. The blanks were prepared by decontaminating the sample processing equipment as described in Section 9 of the Technical Work Plan, Volume II (Golder 1990b), followed by a final rinse with deionized water and collection of the rinsate in the proper containers. Iron was detected at 27 to 27.7 μg/L; however, it was also detected in the laboratory blank. Iron is common in the alloys used in drilling and sampling equipment. Fluoride was not detected, and the pH was 5.38.

6.4.2 Field Duplicates

Field duplicate sample analysis results were within the recommended control limits (see Table 3). Although no data quality criteria exist for field duplicates, the EPA data validation guidelines recommend that the relative percent difference (RPD) for laboratory duplicates fall within a control limit of $\pm$20% for water samples and $\pm$35% for soils when sample values are greater that 5 times the sample detection limit (EPA 1988a).

6.4.3 Performance Audit Samples

Performance audit samples were prepared by spiking laboratory supplied deionized water with a quality control reference sample obtained from the U.S. EPA Environmental Monitoring and Support Laboratory in Cincinnati, Ohio. All the detected sample analysis results submitted from the laboratories were within the EPA defined control limits for each parameter of interest with the exception of methylene chloride, which was also detected in the associated laboratory method blank.

Table 3.

FIELD DUPLICATE ANALYSIS RESULTS
LAND DISPOSAL UNIT CPP-39

Sample ID: CPP39-2A-M-1-2
CPP39-2A-M-1-2D

Analyte/Compound	Initial Result	Duplicate Result	* Relative Percent Difference
Arsenic	4.5	4.6	2.2
Barium	117	104	12
Cadmium	1.0 U	1.0 U	NC
Chromium	22.2	23.7	6.5
Iron	12,700	12,600	0.8
Lead	7.2	6.8	5.7
Mercury	0.10 U	0.11 U	NC
Nickel	17.4	18.9	8.3
Selenium	0.61 U	0.61 U	NC
Silver	2.1 U	2.2	NC
pH	12.0	11.6	3.4
Fluoride	8.76	8.96	2.3

U - The reported value is at or below the sample detection limit.

NC - Result not calculable due to one or both values below the sample detection limit or not detected.

* - All samples were below the EPA standard of ±35%.

6.5 Data Validation, Evaluation, Reporting

6.5.1 Data Validation

All sample and analysis results were reviewed and validated in accordance with Section 8 of the Technical Work Plan, Vol. II - Quality Assurance Project Plan (Golder 1990a) and with EPA data validation guidelines (EPA 1988a and 1988b). All soil samples to be analyzed for volatile organics were analyzed within 7 to 14 days. Other soil samples with critical holding times, such as mercury were analyzed within 28 days. Acetone and methylene chloride were detected in some of the soil samples, however, they are common laboratory contaminants and were dropped from consideration in accordance with criteria in the data validation guidelines (EPA 1988b).

4,4-DDD (65 μg/Kg) and 4,4-DDT (63 μg/Kg) were detected in the 15-foot sample taken from the dry well. Further review of the raw data showed that the second column confirmation data did not agree with the quantification column analysis, numerous interfering and co-eluting peaks were present and the data were not confirmed by GC/MS analysis. Thus, the data was eliminated from consideration.

6.5.2 Background Data Evaluation

Data from background samples collected in 1986 and 1987 by the UURI was utilized. Ten background samples were collected to support preliminary sampling activities at LDU CPP-48 and SWMUs CPP-45 and CPP-46 (UURI 1986, UURI 1987). A summary of the background data is provided in Table 1. Also shown on the table are the one-sided upper tolerance intervals (UTL) for the background data.

A background tolerance interval is a concentration range from background data in which a large portion of the background observations should fall within a high probability. Tolerance intervals establish a concentration range that is constructed to contain a specified proportion or coverage (P%) of the population with a specified confidence coefficient (Y) (EPA 1989). The tolerance interval used for this characterization is based on the assumption that the population is normally distributed with 95% coverage of the samples at a 95% confidence interval.

There are potential limitations that have been considered in the use of the data obtained by UURI for determining action levels based on background concentrations. These include the following:

- All UURI background data were obtained in the shallow surface soils (0-24 inches) and may not be representative of other soil types or horizons;
- Many areas of the ICPP have been graded and/or filled, hence the background data may not be representative of other soils at the ICPP.
- There may be widespread elevated concentrations of certain constituents above the natural background at the ICPP from both point and nonpoint sources. It is not appropriate to establish action levels based on natural background if there is widespread elevated concentrations of constituents at the ICPP unrelated to the releases associated with the LDU.
- The background data was not validated, hence its validity cannot be ascertained. Therefore, the data can be used for a relative rather than an authoritative comparison.

6.5.3 Data Reporting

All data was reported in its reduced and raw forms along with the appropriate units of measurement and uncertainty values for data validation. The data is reported in its reduced form in this document and the final report; however, the raw data is available upon request.

7.0 HEALTH AND ENVIRONMENTAL ASSESSMENT

A Health and Environmental Assessment (HEA) was conducted to evaluate the impact of hazardous constituents present at a site. The HEA involves identifying the contaminants of concern, the concentrations of these compounds in the affected environmental media, and exposed or potentially exposed human or environmental receptors. The essential element of this assessment is the development of an appropriate set of health and environmental criteria to which the measured or predicted concentrations of toxic contaminants are compared. This criteria is primarily based on EPA-established chronic-exposure limits. When the criteria is exceeded, there is a likelihood of adverse health or environmental effects, and additional measures may be required to prevent or reduce these effects.

7.1 Identification of Toxic Contaminants

7.1.1 Containment Vault

For the containment vault, analysis of the surficial concrete and soil beneath the concrete resulted in nine inorganics being detected. Seven of the inorganics (arsenic, barium, cadmium, chromium, lead, mercury, and selenium) are not included in this HEA, because they did not exceed background concentrations or were analyzed but not detected at the given detection limit (Table 4). However, silver was detected at 2.4 mg/kg, which exceeded background levels. These levels do not pose a human health risk due to limited toxicity associated with chronic exposure to inorganic silver. The discussion concerning fluoride is deferred for further evaluation in Section 7.2 of the HEA, having been detected in all samples tested and present at 414 mg/kg in a surface concrete sample.

Table 4.

INORGANIC SAMPLE ANALYSIS RESULTS
LAND DISPOSAL UNIT CPP-39, CONTAINMENT VAULT
(Results in mg/Kg)

Borehole	Depth (feet)	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver	pH	Fluoride
CPP39-01	Surface	2.7	108	1.1 U	11.9	5.4	0.11 U	3.1 U	2.1 U	11.8	414
	1	6.0	128	0.97 U	21.7	10.0	0.10 U	0.6 U	1.9 U	9.59	28
	2.5	5.7	156	1.0 U	27.4	11.7	0.10 U	0.63 U	2.1 U	8.59	18.5
CPP39-02	Surface	2.8	72.6	1.0 U	9.9	5.0	0.11 U	0.6 U	2.0 U	12.4	8.15
	1	5.3	188	1.0 U	32.3	9.8	0.10 U	0.61 U	2.4	11.4	36.1
CPP39-02A	Surface	2.5	82.4	1.0 U	11.0	3.3	0.09 U	0.62 U	2.1 U	12.6	0.341
	1	4.5	117	1.0 U	22.2	7.2	0.10 U	0.61 U	2.1 U	12.3	0.930
CPP39-02B	Surface	2.9	64.7	1.0 U	9.9	3.0	0.10 U	0.63 U	2.1 U	12.6	1.10
	1	5.8	129	1.0 U	22.6	10.3	0.09 U	0.62 U	2.1	12.0	8.76
	2	4.7	161	1.1 U	25.7	11.9	0.11 U	0.63 U	2.3	9.81	2.96
	4	4.8	162	1.0 U	24.7	5.1	0.10 U	0.59 U	2.1 U	9.81	172
CPP39-03	Surface	2.5	71.1	1.0 U	10.3	2.9	0.10 U	0.62 U	2.0 U	12.5	0.652
	1	4.2	124	1.0 U	21.0	8.9	0.10 U	0.62 U	2.1 U	12.4	1.74
	2	5.1	140	1.0 U	28.7	8.6	0.10 U	0.62 U	2.0 U	8.81	3.22
	4	6.4	94.9	0.98 U	20.7	7.5	0.09 U	0.60 U	2.0 U	8.55	34.4
Maximum Value		6.4	188	N/A	32.3	11.9	N/A	N/A	2.4	12.6	414
Minimum Value		2.5	64.7	N/A	9.9	2.9	N/A	N/A	2.1	8.55	0.341
Detection Limit		2.0	40	1.0	2.0	1.0	0.10	1.0	2.0	N/A	0.125
Background UTL		8.7	403	5.0	42	24	0.07	0.868	2.0	N/A	N/A

U - analyte not detected, the reported value is the sample detection limit.
N/A - not applicable.

7.1.2 Dry Well

Analysis of soil samples from the dry well indicated two inorganics (lead and silver) exceeding background concentrations, but they are not at levels that pose a human health risk (Table 5). Lead is not considered further in this HEA because the concentration detected at 31.1 mg/kg is considerably less than the soil concentration of >500 mg/kg determined necessary to produce an increase in blood lead levels in sensitive populations exposed to lead containing soils (EPA 1989b). Silver (18.7 mg/kg) is not considered further in the HEA because the detected level and limited toxicity associated with exposure to soils containing silver do not pose a human health risk. The discussion concerning arsenic and fluoride is deferred for further evaluation in Section 7.2 of the HEA.

Bis (2-ethylhexyl)phthalate (BEHP) and eleven polycyclic aromatic hydrocarbons (PAHs) were identified at a depth of 15 feet in the soil at the dry well (Table 6). A discussion of these organic compounds is deferred for further evaluation in Section 7.2 of the HEA.

7.1.3 Evaluation of Constituents

BEHP is a chemical compound used as a plasticizer and has been found to be widely distributed in the environment, and it is a common laboratory contaminant.

PAHs are formed during the incomplete burning of coal, oil, gas, garbage, and other organic substances and can be either man-made or naturally occurring. Little information is available about the effects of PAHs.

Fluoride toxicity is associated with any soluble fluoride compound that dissociates to produce fluoride ions. However, the type and severity of toxicity varies with the chemical form, route of exposure, and the

Table 5.

INORGANIC SAMPLE ANALYSIS RESULTS
LAND DISPOSAL UNIT CPP-39, DRY WELL
(Results in mg/Kg)

Borehole	Depth (feet)	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver	pH	Fluoride
CPP39-04	15	12.4	189	1.3	11.8	31.1	0.12 U	0.21 U	18.7	NT	NT
	25	6.8	180	1.1 U	31.5	8.2	0.10 U	0.65 U	2.1 U	5.97	233
	30	8.4	162	1.0 U	25.3	8.8	0.08 U	0.62 U	2.1 U	6.08	105
	35	8.5	117	1.1 U	22.8	5.2	0.10 U	0.63 U	2.1 U	8.98	23.3
	40	9.1	113	1.0 U	17.4	9.4	0.10 U	0.64 U	2.1 U	8.82	17.1
	45	7.8	204	1.1 U	25.6	10.2	0.10 U	0.65 U	2.1 U	7.28	17.1
	50	10.2	229	1.4	25.9	20.1	0.10 U	0.33	0.75	8.73	8.26
Maximum Value		12.4	229	1.4	31.5	31.1	N/A	0.33	18.7	8.98	233
Minimum Value		6.8	113	1.3	11.8	5.2	N/A	N/A	0.75	5.97	8.26
Detection Limit		2.0	40	1.0	2.0	1.0	0.10	1.0	2.0	N/A	0.125
Background UTL		8.7	403	5.0	42	24	0.07	0.868	2.0	N/A	N/A

U - analyte not detected, the reported value is the sample detection limit.
N/A - not applicable.
NT - not tested.

Table 6.

SEMI-VOLATILE ORGANIC RESULTS FROM LAND DISPOSAL UNIT CPP-39 DRY WELL
(Results in ug/Kg)

COMPOUND	CONCENTRATION
Phenanthrene	1,100 J
Anthracene	180 J
Fluoranthene	2,300
Pyrene	1,300 J
Benzo(a)Anthracene	860 J
Chrysene	1,600 J
bis(2-Ethylhexyl)Phthalate	14,000
Benzo(b)Fluoranthene	1,100 J
Benzo(k)Fluoranthene	970 J
Benzo(a)Pyrene	500 J
Indeno(1,2,3-cd)Pyrene	480 J
Benzo(g,h,i)Perylene	270 J

J - Estimated concentration below the sample quantitation limit duration of exposure. The form of fluoride most likely present at LDU LDU CPP-39 is calcium fluoride, which is produced when hydrofluoric acid is neutralized with limestone as occurred in the containment vault and dry well. The acute toxicity of calcium fluoride is considered to be relatively minor because of the low solubility and low ionization of salt. Chronic effects may occur from long term ingestion of calcium fluoride or the inhalation of low levels of calcium fluoride dust.

7.2 Conclusions for LDU CPP Health and Environmental Assessment

Five boreholes were drilled to depths of up to 4 feet in the containment vault and one borehole was drilled to the top of the basalt (52.2 feet) in the dry well at LDU CPP-39. Concrete and soil in the containment vault were analyzed for RCRA metals, pH, and fluoride. In addition to these parameters, two samples in the dry well (at 15 and 50 feet below land surface) were analyzed for the 40 CFR Part 261 Appendix VIII constituents.

In the containment vault, silver (2.4 mg/kg) was detected above background UTL in one sample. This is only slightly higher than the sample detection limit (2.0 mg/kg). The maximum concentration of fluoride detected in the containment vault was 414 mg/kg from a sample of concrete at one location. The highest concentration detected in the soil beneath the vault was 172 mg/kg. Samples at other locations in concrete and soil were considerably lower, ranging from 0.0341 to 36.1 mg/kg. The pH of the concrete samples from the containment vault ranged from 11.8 to 12.6. This indicates that sufficient limestone was present in the vault to neutralize any spilled acids.

In the dry well, at 15 feet below land surface, arsenic, lead, and silver were detected at concentrations above the background UTL. Arsenic was also detected at two other sample intervals exceeding the UTL. However, the background UTL has been determined for shallow soils and may not be representative for comparison with other soil horizons. Bis(2-ethylhexl)pthalate and several PAHs were also detected at 15 feet below land surface.

Adverse health effects associated with contaminants at LDU CPP-39 are considered negligible because of low concentrations and limited exposure due to depth. There may be a potential for increased cancer risk from PAHs if the dry well's soils are excavated and a pathway to exposure is provided. However, there is insufficient data for individual PAHs to quantitatively determine the risk posed. Carcinogenic slope factors are not available for any of the PAHs. A conservative estimate indicates that the cancer risk is 2E-05. This estimate assumes a slope for all carcinogenic PAHs is equal to a previously published value for benzo(a)pyrene that the EPA has since withdrawn. Any risk associated with these compounds would also diminish with time because microorganisms biodegrade PAHs in the soil. If the dry well soils are removed, they should be handled and disposed of within EPA guidelines.

8.0 DECONTAMINATION PROCEDURES

8.1 Sampling Equipment Decontamination

The drill rig was decontaminated by the drilling contractor prior to entry to LDU CPP-39 using high-pressure steam at a designated decontamination area near the ICPP. Sampling personnel visually inspected the rig and downhole tools before they were brought on site for grease, hydraulic fluids, or other visible materials that might potentially contaminate the boreholes.

After each use, sampling equipment was screened with a beta-gamma survey instrument to ensure there was no residual radioactivity. All split-spoon samplers, lexan liners, and associated sampling equipment not contaminated with radiation were decontaminated by the sampling subcontractor.

Decontamination between sample locations consisted of the following:

- steam cleaning with deionized water and wiping dry;
- rinsing with a towel or rag soaked lightly with methanol and allowing to air dry;

- o rinsing with deionized water and wiping dry, then sealing in plastic until the next period of use.

All drilling and sampling equipment was decontaminated at completion of the work, as outlined above. Prior to leaving the site all equipment was surveyed by a WINCO health physicist for radioactivity (routine activity). Samples were collected from the decontamination rinseate trough prior to pumping the material into 55-gallon barrels for storage and disposal.

9.0 CLOSURE PROCEDURES

No RCRA hazardous wastes were detected, and all RCRA hazardous constituents detected were present at levels below those that would pose an unacceptable risk to human health and safety or the environment. For these reasons, there does not appear to be any basis for remediation. It is therefore being recommended that LDU CPP-39 be closed without removal actions.

10.0 GROUNDWATER MONITORING

Presently, there are no groundwater monitoring wells in the immediate vicinity of LDU CPP-39. However, numerous wells are already in place around ICPP for sampling the regional aquifer. Currently a groundwater monitoring plan is being developed for the ICPP.

11.0 CLOSURE CERTIFICATION

If closure activities are required by regulatory agencies following review of this plan, the amended closure plan or report, project design criteria, and all associated abandonment activities which may be developed, will be reviewed by a registered professional engineer. Upon completion of closure activities, a certification will be obtained from the engineer stating that LDU CPP-39 has been properly abandoned in accordance with this closure plan.

12.0 AREA RESTORATION

Since the area inside the ICPP is controlled for security purposes, no vegetation is present. No further action is being proposed at this time and no restoration will be needed.

13.0 OTHER TOPICS OF CONCERN

At this time no other topics of concern have been identified with LDU CPP-39.

14.0 COST SCHEDULE

A budget for future activities will be established if additional activities are required.

15.0 SCHEDULE OF ACTIVITIES

This closure plan is being submitted to EPA Region X and the State of Idaho for approval on or before December 6, 1990, as required by the COCA schedule.

16.0 POST CLOSURE

Becasue no further RCRA closure activities are planned for this site, there is no plan for post-closure care proposed.

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